

# **Nutrient Criteria Development Advisory Work Group**

## **January 26, 2004**

### **Meeting Summary**

#### **Welcome & Introduction - Jim Davenport**

#### **Meeting Rules & General Workgroup Purpose - Barbara Simer**

#### **USGS Data Analysis Update - Evan Hornig**

- Selection of Reference Reservoirs based on reservoir & upstream segment land uses, select reference reservoirs
- Information used to determine land use in the watershed
  - Urban and Agriculture measured in the API (pasture and fallow not used)
  - If below 10% then looked at land use in the truncated watershed
  - If still below 10% then looked at amount of discharges into reservoir
  - No major municipal discharges
  - Additional consideration - Feedback from Texas Nutrients Group
- Purpose of Reservoir Group - to investigate linking criteria for non-reference lakes to reference lake conditions
- Considerations:
  - Regional (e.g. ecoregions)
  - Lake hydrology (residence time)
- Preliminary Results
  - Total Basin Area
  - Basin Slope
  - Mean Depth
- Texas Nutrient Database
  - All TCEQ TRACs and USGS NWIS data retrieved from 1/70 thru 4/93
  - Data from main pool sites of designated reservoirs selected
  - Data from depths less than 2 feet (.61M<sup>3</sup>) selected
  - All lake and date duplicates averaged
  - USGS fields renamed to match NWIS
  - Because of database structure differences, data from databases are appended by parameter
  -

#### **Trinity River Basin Reservoir Uses Study Update - Paul Jensen & Richard Kiesling**

- Provided charts on total phosphorus (TP) and total nitrogen (TN) and their correlation with Chlorophyll *a*.
- Has data for Orthophosphorus if anyone wants it
- Graphs indicated TN:TP ratios in reservoirs where ratio was >10, better relationship of mean TP to mean Chlorophyll *a*
- If TN:TP<10 Nitrogen may be limiting
- Summer TN:TP with only summer data were not as predictive as using all of the data
- USEPA launched National Nutrient Strategy initiative in 1998
- Main goal is to have states and tribes adopt numerical criteria for either nutrients or response variables such as chlorophyll *a*
- Texas has narrative nutrient criteria rather than numerical
- The 1972 Clean Water Act requires states to adopt, with EPA approval, water quality standards that include:
  - Designated uses such as swimming, drinking water supply, etc.

- ▶ Criteria to determine whether the uses are being achieved and,
  - ▶ An anti-degradation policy
- Nine reservoirs in Texas chosen for detailed study based on geographic land use and size diversity, and date availability factors
- Data retrieved from a range of sources
- Analyses organized around major uses that are specified in standards
  - ▶ Recreation
  - ▶ Aquatic life propagation
  - ▶ Water supply
- Contact recreation is the only recreation now designated in the standards
- Specific criteria associated with that use are for indicator bacteria
- All of nine reservoirs used for recreation,
- Multivariant cluster ordination indicated preliminarily that total basin area, basin slope, and mean depth were the most important factors in dividing reservoirs into groups
- Lial Tishchler suggested that other papers had looked into winter loading and compared it to chlorophyll a concentrations in the summer, since the loading from the winter would be held in reserve until summer
- Groeger/Ted Ground paper was referred to as a way to group reservoirs
- Texas Parks and Wildlife Department manages lakes for sport fishing
- Chlorophyll a is the best indicator of potential use impairment
- Don't see a correlation in upper concentrations of chlorophyll a
- Fisheries literature describes TP in concentrations of 60-70 ug/L and secchi disk depth of 18 inches as ideal for fishery management
- Suggested format of determining uses on reservoirs similar to that of Texas Water Development Board where all stakeholders come together and decide on the uses that are unique for each reservoir

#### **TWCA Uses Survey Update - Peggy Glass**

- Representing Texas Water Conservation Association
- Characterized recreation uses.
- They are looking at data from the main body and cove sites.
- Feel that it is important to use Chlorophyll a and pheophytin both in analyses.
- Divided reservoirs by secchi disk depth and then looked at chlorophyll a.
- Travis and Canyon - 5 -10- ug/L, Turbid reservoirs were in the 30 - 50 ug/L range.
- Transparency may be a better way to divide reservoirs into groups. When you group by clarity you can then divide reservoirs into those where algae are reducing the clarity and those where it is inorganic turbidity.
- Chlorophyll a techniques were discussed.
- Survey may not be capturing all of users, because those that don't use water because of turbidity will not be out on the lake.
- Algal speciation may be important in user perceptions. Larger algae or scum may be more objectionable, but the chlorophyll a data may not show as high numbers as smaller algae, and scum probably would not be sampled.
- Coordinated with TCEQ for quality control
- Samples must be done on same day and not after storm event

**Focused Question #1 Review the attached list. Based on your knowledge of local factors, are there any reservoirs that need to be moved from one list to another? Please explain why you would move them. Ex. Move a reservoir from potentially impacted to least impacted due to agriculture buffer zones around the reservoir.**

1. Move Cedar Creek to Major domestics list, 8MGD, 2% of annual inflow. Not much agriculture in watershed (Mark Ernst)
2. Move Eagle Mountain to the Major domestics list, 5.2 MGD 5.6% annual inflow. Not much agriculture in watershed (Mark Ernst)
3. Move Richland Chambers to the Urban/Ag list. 33% Urban/Ag more impact than 9.6 MGD, 1.4% of annual inflow. (Mark Ernst)
4. Reevaluate Choke Canyon position. Where is WWTP. (Paul Jensen). Move to least impact list, WWTP not on the reservoir?
5. Re-evaluate LBJ (Alicia Reinmund) LBJ - 95% or more of land use is grassland and should be moved to least imp list
6. Move Lake Texana to least impacted list because of 150' buffer required around the lake (Sylvia Balentine, LNRA. However, 2 hour stream travel time may be questionable, dye study)
7. Move Lake Conroe from least impacted. Complaints about algae in Lake Conroe (Lythia Metzmeier). Use to have lots of macrophytes until grass carp added. Shoreline development moves it from the least list.
8. Lake Travis also has a lot of shoreline development
9. Toledo Bend should be moved to least impacted. Data from 305B report is for coves.
10. Somerville has fish kills and lots of input of ground water from Alcoa. Should be moved from the least impact list.
11. Lake Fork has a large number of CAFOs (dairy) in the watershed and lots of macrophytes.
12. Mexia - is 303D listed. There is a special study?
13. Belton - on impacted list, but has low nutrients (see Carlson's BI)
14. 303d listed reservoirs should not be on least impact list
15. Sam Rayburn has large industry and DO issues
16. Some lakes have been left off, ex. Dunlap, Mc Quinney (Groeger data), why? (Ed. Note: not a segment)
17. Remove Lake Cherokee from least impacted list because is a power plant lake.

**Focused Question #2 Based on your knowledge of reservoirs in general and those you deal with locally, what factors are important to you for identifying least impacted reservoirs and separating them from those with more anthropogenic development in their watersheds?**

- Exclude power point lakes ex. Lake Cherokee
- Factor in CAFOs, poultry houses
- Collect Historical data sources - universities, river authorities, data not in TRACS,
- Not good to use ecoregion to group reservoirs, ex. region 35, South Central Plains has a wide range of chlorophyll a values.
- Determine why a reservoir is on the least impact list.
- Don't use least impacted reservoirs as reference for non-reference reservoirs
- The information is a snapshot of data
- The group needs more of a distinction for what constitutes a reference and a non-reference reservoir.
- Will pasture land in the watershed keep a reservoir off the least impacted list?
- Uses should be a factor in grouping reservoirs
- Investigate a bloom frequency approach
- By 200? 19% of drinking water will be recycled through reservoirs.
- Members questioned why they were doing this exercise and what would be done with it.
- It is possible to determine if people are happy with the way a reservoir is now. If there are no perceived problems, then this exercise is a mute point.
- There should be an indication of a problem.

- The method for developing the criteria should be developed first.
- What is going to happen to small reservoirs with no data?
- Suggested that there be a subset of high clarity reservoirs that we protect.
- Suggested that there be a subset of turbid lake which will be looked at individually.
- Fundamental watershed and reservoir interactions, such as the natural aging of reservoirs should be considered. Evaluate productivity. Look for major deviations of nutrient cycling and sedimentation.
- Use regional BPJs to group reservoirs
- Perform regional comparisons of algal groups. Species composition will provide more information, though it is more expensive to do.
- If reservoir is on the least impacted list and there is a cove that is listed on the 303d or 305b, should it be listed?
- More land use categories are needed
- There should be a general screening. Then each reservoir is looked at individually before it is placed in on any list.
- Reservoirs that touch other states. We should be considering what the other state is doing with criteria on that lake and be consistent. Ex. Toledo Bend

#### **Factors to consider:**

- Hydrology
- the impact on the entire reservoir of development in one arm
- % of macrophytes in lakes - may be hard to get an estimate of this.
- what is going on upstream in other reservoirs, in API, in river flowing into a reservoir. Ex. Lake Travis has upstream reservoirs to filter out sediment
- watershed land use changes over time.
- septic system use on reservoir
- nutrient and sediment loadings
- ecoregion
- toxic or algal blooms
- elevated total dissolved solids (TDS)
- spatial distribution and type of agriculture in the water shed. 10% may not be appropriate
- spatial distribution of high intensity anthropogenic influences
- the sum of all discharges, not just the largest discharger
- Nonpoint pollution
- shoreline development
- lake levels, variable vs. fixed
- mean depth
- residence time
- water chemistry and clarity
- Carlson's index, which will provide a broad view of nonalgal turbidity
- nutrients in sediment
- proximity of the land use to the reservoir as a 2<sup>nd</sup> step
- presence of immediate buffers, ex. No shoreline development
- water quality trends
- land application
- nutrient residence time
- water transfers between basins

## **Sidne Tiemann**

Provide input on the format of this workgroup. Next workgroup may be in late April or early May. Possible topics were discussed.

## **Jim Davenport**

Least impacted reservoirs will be used in ambient approach to hold the status quo if there are no overriding issues with use. They will be used as screening for impacted reservoirs. Screening includes a number for criteria for impacted and for the 305B report.

1. Relative roles of ambient and use based criteria  
Improve on EPA's national approach
2. Propose specific criteria for specific reservoirs based on ambient data
3. Implementation could deal with the following
  - localized influences on reservoirs
  - 303D list
  - large dischargers affect on reservoirs
  - Looking into separate criteria at local areas
  - Developing screening levels
  - Effluent requirements in watersheds
4. Appropriate schedule to develop criteria
5. Process to work through other reservoirs, including Screening and additional work

## **Other topics**

### **Chlorophyll a testing**

Sabine River submitted a report to TCEQ on a more QA/QC'd method. That information has not been redistributed to sampling entities in the state. Peggy Glass suggested that TCEQ hold a workshop to educate sampling entities of the method and request that they start using it to sample chlorophyll a. Dr. Groeger indicated that the current methods would produce good data.

### **Criteria**

Keep the list of criteria short and do a logic test. Base criteria on uses to protect the water bodies.

It was noted that people wanted to keep the high clarity lakes that way.

The question was asked if the intent of identifying least impacted reservoirs was so that TCEQ could designate outstanding natural resource waters.

Texas Parks and Wildlife Department offered to do a presentation on the data that they collect and how they use it.

The suggestion was made to decide what would be considered unacceptable conditions for a reservoirs and create a short list of those reservoirs that everyone could agree on.

It was suggested that we could have three categories of reservoirs, including those exceeding the fishable

swimmable wording in the CWA. What are the attributes of a reservoirs that meets the CWA for fishing and recreation..

Several people were in support of site specific criteria for each individual reservoir.

A process based approach was favored which would protect the clear reservoirs, identify a middle group, and work on a third group that needed work.

A process could be submitted to EPA as a method if the steps were defined.

TCEQ hopes to have some reservoir criteria by the end of 2004.

Members suggested a dual tract for criteria development, a quantitative approach which could take the form of a translator or procedures instead of a number. Or a number or a procedure that was in a document other than the standards. This would make it easier to refine and improve the criteria.

Members suggested that TECQ proposed a number to them and a process to deal with the more eutrophic reservoirs.

Evan Hornig (USGS) requested more land use information from members that are closer to the areas in the areas that they are familiar with.

## **Attachment A**

**Potentially Impacted Reservoirs - Urb/Ag Land Use >10%<sup>1</sup>**

RESERVOIR	%	COMMENTS
Aquilla Reservoir	27	
Bardwell Reservoir	28	
Brady Creek Reservoir	23	
Bryan Municipal Lake	76	
Buffalo Springs Lake	13	
Cedar Creek Reservoir <sup>4, 6, 7</sup>	12	
Cox Lake	12	
E.V. Spence Reservoir	17	
Eagle Mountain Reservoir <sup>4, 7</sup>	18	
Fin Feather Lake	82	
Granger Lake	28	
Greenbelt Reservoir	36	
Joe Pool Lake	25	
Lake Arlington	59	
Lake Arrowhead	12	
Lake Austin	16	
Lake Brownwood	11	
Lake Coleman	20	
Lake Colorado City	29	
Lake Crook	14	
Lake Fort Phantom Hill	27	
Lake Graham	23	
Lake Granbury	17	
Lake Houston	13	
Lake Kemp	19	
Lake J.B. Thomas	42	
Lake Kickapoo	13	
Lake Livingston <sup>4, 5, 6, 7</sup>	17	
Lake Lyndon B. Johnson	11	
Lake Mackenzie	17	
Lake Nasworthy	31	
Lake Ray Hubbard <sup>4, 5</sup>	23	
Lake Ray Roberts	13	
Lake Stamford	27	
Lake Sweetwater	14	
Lake Tanglewood <sup>4, 5, 6, 7</sup>	64	
Lake Texana	15	
Lake Texoma	36	
Lake Theo	14	



<b>Potentially Impacted Reservoirs - Urb/Ag Land Use &gt;10%<sup>1</sup></b>		
Lake Waxahachie	24	
Lake Weatherford	14	
Lake Whitney	40	
Lake Wichita	23	
Lake Worth	19	
Leon Reservoir	14	
Lewisville Lake	23	
Millers Creek Reservoir	17	
Navarro Mills Reservoir	32	
O.H. Ivie Reservoir	31	
Oak Creek Reservoir	17	
Palo Duro Reservoir	10	
Pat Cleburne Reservoir	14	
Pat Mayse Reservoir	16	
Proctor Lake	21	
Town Lake	67	
Twin Buttes Reservoir	13	
White Rock Lake	73	

Potentially Impacted Reservoirs - Major Domestics <sup>2</sup>	
RESERVOIR	COMMENTS
Belton Reservoir	
Benbrook Lake <sup>4</sup>	
Choke Canyon	
Falcon Lake	
Grapevine Reservoir	
Lake Anahuac	
Lake Lavon	
Lake Meredith	
Lake O' The Pines	
Lake Palestine	
Lake Tawakoni <sup>4, 6</sup>	
Lake Tyler east	
Lake Waco <sup>4, 5</sup>	
Possum Kingdom Reservoir	
Richland-Chambers Reservoir <sup>4,5</sup>	
Toledo Bend Reservoir <sup>4, 6</sup>	
White River Lake	

Least Impacted Reservoirs <sup>3</sup>	
RESERVOIR	COMMENT
Amistad Reservoir	
B. A. Steinhagen Reservoir	
Caddo Lake	
Canyon Lake	
Diversion Lake	
Ellison Creek Reservoir	
Farmers Creek (Nocona Lake)	
Houston County Lake	
Hubbard Creek Reservoir	
Inks Lake	
Lake Amon G. Carter	
Lake Bob Sandlin	
Lake Bridgeport	
Lake Buchanan	
Lake Cherokee	
Lake Cisco	
Lake Conroe	
Lake Corpus Christi	
Lake Cypress Springs	
Lake Fork Reservoir	
Lake Georgetown	
Lake Jacksonville	
Lake Limestone	
Lake Marble Falls	
Lake Mexia	
Lake Murvaul	
Lake Palo Pinto	
Lake Travis	
Lake Tyler	
Medina Lake	
O.C. Fisher Reservoir	
Red Bluff Reservoir	
Sam Rayburn Reservoir	
Somerville Lake	
Stillhouse Hollow Lake	
Wright Patman Lake <sup>4, 7</sup>	

## Footnotes

- 1 Number following lake name is % of urban and agricultural land use within the 2-hour travel time of reservoir and/or upstream segment
- 2 Major domestics (>1MGD) discharge to reservoir and/or upstream segment
- 3 Reservoirs with % of urban and agricultural land use less than 10% and with no major domestics
- 4 Reservoirs with secondary concerns for chlorophyll a from the 305B report
- 5 Reservoirs with secondary concerns for chlorophyll a & NO<sub>3</sub> + NO<sub>4</sub> from the 305B report
- 6 Reservoirs with secondary concerns for chlorophyll a & Orthophosphorus from the 305B report
- 7 Reservoirs with secondary concerns for chlorophyll a & total phosphorus from the 305b report

**Nutrient Criteria Development Advisory Work Group  
Attendee List  
January 26, 2004**

<b>Larry Hauck</b>	<b>TIAER</b>
<b>Dolan McKnight</b>	<b>NTMWD</b>
<b>Pat Radloff</b>	<b>TPWD</b>
<b>Glenn Clingenpeel</b>	<b>TRA</b>
<b>Lisa McCurley</b>	<b>Hill Country Environmental</b>
<b>Lauren Kalisek</b>	<b>Lloyd Gosselink</b>
<b>Phillip Crocker</b>	<b>EPA</b>
<b>Allen White</b>	<b>USFWS</b>
<b>Peggy Glass</b>	<b>APAI- Representing TWCA</b>
<b>Lial Tischler</b>	<b>Tischler/Kocurek</b>
<b>Mary Vann</b>	<b>Sabine River Authority</b>
<b>Alicia Reinmund</b>	<b>LCRA</b>
<b>Larry Koenig</b>	<b>TCEQ</b>
<b>Charles Bayer</b>	<b>TCEQ</b>
<b>Woody Frossard</b>	<b>Tarrant Regional Water District</b>
<b>Paul Jenson</b>	<b>PBS &amp; J</b>
<b>John Taylor</b>	<b>TPWD - Inland Fisheries</b>
<b>Ruben Solis</b>	<b>LCRA</b>
<b>Russell Kiesling</b>	<b>USGS</b>
<b>Bob Betwill</b>	<b>TPWD</b>
<b>Gary Garrett</b>	<b>TPWD</b>
<b>Sara Burgin</b>	<b>Baker Botts</b>
<b>Kevin Wagner</b>	<b>TSSWCB</b>
<b>Jay Bragg</b>	<b>TSSWCB</b>
<b>Karolyn Hardaway</b>	<b>Eastman</b>
<b>Mark Ernst</b>	<b>TRWD</b>
<b>Angela Rodriguez</b>	<b>LCRA</b>
<b>Lythia Metzmeier</b>	<b>TCEQ</b>
<b>Patricia Wise</b>	<b>TCEQ</b>
<b>Laurie Curra</b>	<b>TCEQ</b>
<b>Allison Woodall</b>	<b>TCEQ</b>
<b>Eric Reese</b>	<b>TCEQ</b>
<b>Al Groeger</b>	<b>Texas State University</b>
<b>Mel Vargas</b>	<b>Parson</b>
<b>Chris Pasch</b>	
<b>Jack Fairchild</b>	<b>SMRF</b>
<b>Myron Hess</b>	<b>NWF</b>
<b>Robert Hanson</b>	<b>APAI</b>
<b>Andrew Covar</b>	<b>Austin Water Utility</b>